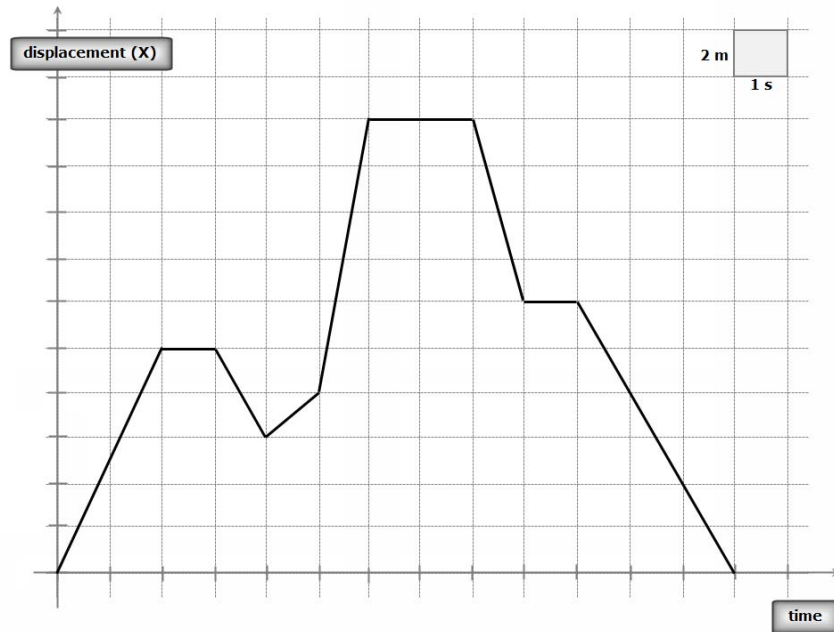


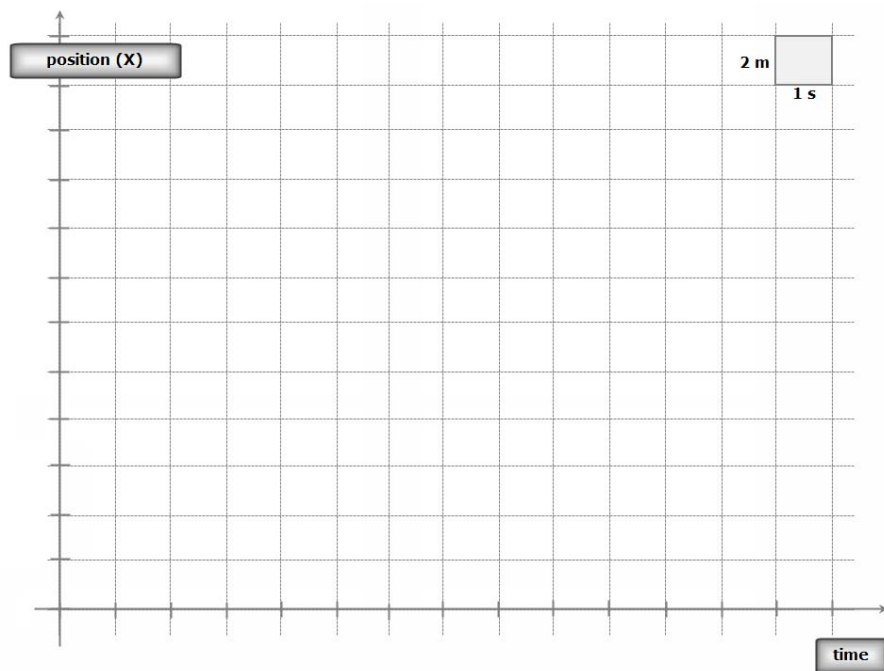
Topic:	Graphical interpretations
Objective:	FK_10_03
Given different graphics (position-displacement-velocity vs time) the student must be capable of doing the following: <ul style="list-style-type: none"> • calculate the following variables: displacement, velocity and acceleration 	

A body moving along the X axis: determining the position-time graph

Let's suppose that a body is moving along the X axis according to the graph below and that its initial position is: $\vec{r}_0 = 4 \vec{i}$ (m)



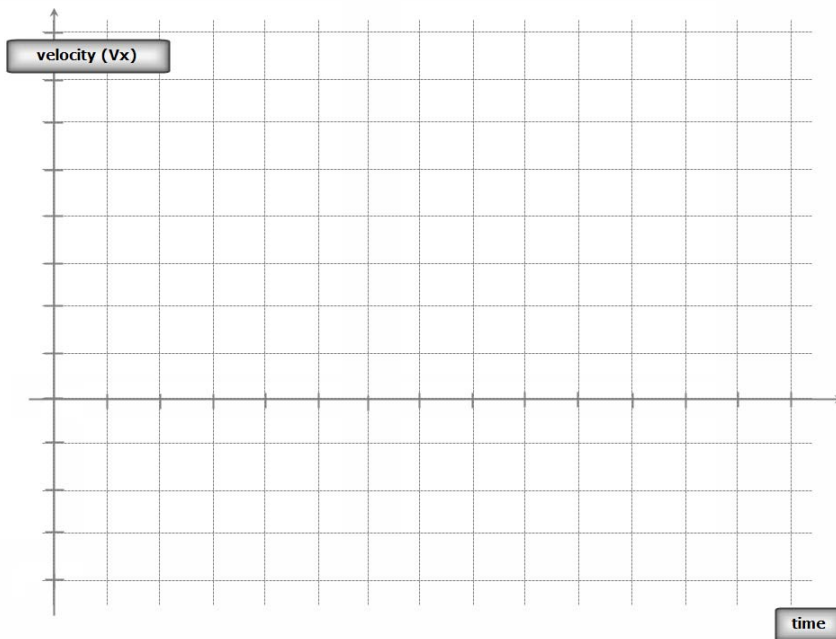
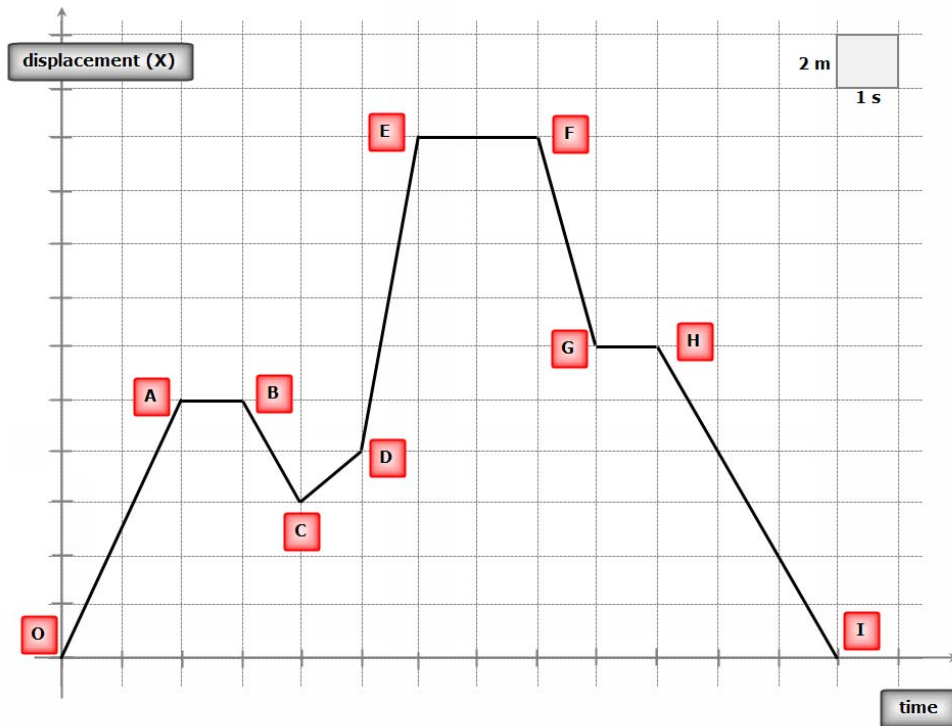
Determine the position – time graph:



A body moving along the X axis: determining the velocity-time graph

In the previous case,

- calculate the velocities of the different sections (O-A, A-B, B-C, C-D, ...)
- calculate the average velocity in the section O-H
- calculate the average speed in the section O-H
- calculate the average velocity in the section O-I
- draw the velocity – time graph



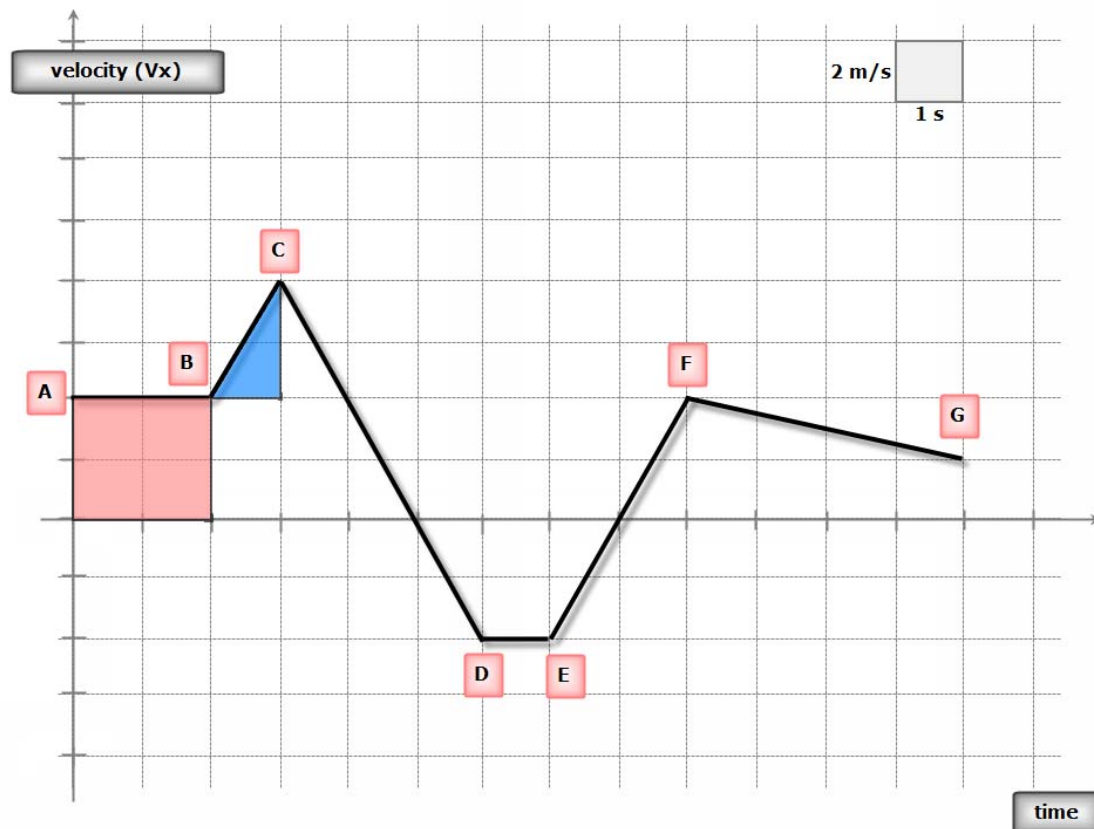
Velocity – time graph

The area under any velocity – time graph is equivalent in value to the displacement in that given time.

The acceleration is the rate of change of velocity:

$$\vec{a} = \frac{\Delta \vec{V}}{t} = \frac{\vec{V} - \vec{V}_0}{t}$$

The slope of the line in a velocity – time graph is the value of the acceleration.



Let's calculate the displacement between $t=0$ and $t=2$ in our example:

$$\Delta x = \text{area under the line} = 4 \frac{\text{m}}{\text{s}} * 2 \text{ s} = 8 \text{ m}$$

$$\Delta \vec{r} = 8 \vec{i} \text{ (m)}$$

Now, we are going to calculate the acceleration in the section B-C:

$$a = \text{slope} = \frac{8 \text{ m/s} - 4 \text{ m/s}}{1 \text{ s}} = 4 \frac{\text{m}}{\text{s}^2}$$

$$\vec{a} = 4 \vec{i} \left(\frac{\text{m}}{\text{s}^2} \right)$$

Velocity – time graph: exercise

Calculate the displacement and the acceleration in each section

